WHAT IS CLAIMED IS:

1. A method of producing a device with a ferroelectric thin film on a first substrate, the method comprising the steps of providing a ferroelectric crystal, of irradiating a first surface of said ferroelectric crystal with ions so that a damaged layer is created underneath said first surface, of bonding a block of material including said first substrate to said ferroelectric crystal to create a bonded element, wherein an interface is formed between said first surface and a second surface of said block, and of heating the bonded element and separating it at the damaged layer, so that a ferroelectric crystal layer remains supported by the first substrate.

2. A method according to claim 1, further comprising the steps of, prior to bonding the block to the second substrate, fabricating said block by providing the first substrate, applying a layer of electrically conducting material to it.

3. A method according to claim 2, wherein the fabricating of said block further comprises the step of applying a dielectric layer to said layer of electrically conducting material, said dielectric layer forming said second surface.

4. A method according to any one of the previous claims, wherein the ferroelectric crystal is a $LiNbO_3$ crystal.

5. A method according to any one of the previous claims, wherein said block comprises a second ferroelectric crystal, said second ferroelectric crystal preferably being a $LiNbO_3$ crystal.

6. A method according to any one of the previous claims, wherein material at second surface has an index of refraction that is lower than the index of refraction of said ferroelectric crystal by at least 10%, and wherein said material is preferably a silicon oxide.

7. A method according to any one of the previous claims, further comprising the step of laterally structuring the ferroelectric crystal layer so that a waveguide core of a 3d waveguide is formed.

8. A method according to any one of the previous claims comprising the step of chemical mechanical polishing of the first substrate prior to the bonding.

9. A method according to any one of the previous claims comprising the step of annealing and/or polishing the ferroelectric crystal layer after the separating step.

10. A method according to any one of the previous claims, wherein the ferroelectric crystal is a bulk ferroelectric crystal.

11. An optical or optoelectronic or electromechanical or piezoelectric or pyroelectric or memory device comprising a first substrate and ferroelectric crystal material supported by said substrate, wherein said ferroelectric crystal material has been transferred as a ferroelectric layer from a ferroelectric crystal using the method according to any one of the previous claims.

12. A device according to 11, further comprising an electrode being formed in a layer parallel to the ferroelectric crystal layer and being positioned between the first substrate and the ferroelectric crystal layer.

13. A device according to claim 12, wherein said electrode is arranged between said first substrate and a dielectric layer on which the ferroelectric crystal layer is arranged.

14. A device according to any one of claims 11 to 13, being an optical wavelength selective filter comprising two waveguide branches, each branch being coupled to at least one micro-resonator, wherein waveguide cores of the waveguide branches and the micro-resonators comprise said ferroelectric material.

15. A device according to claim 12 or 13 being a Mach-Zehnder modulator comprising two waveguide branches, cores of which are comprise said ferroelectric material, and wherein at least one branch comprises an electrode for influencing the index of refraction of the ferroelectric material.

16. A device according to claim 12 or 13 being wavelength selective switch with two waveguide branches, each branch being coupled to at least one micro-resonator, wherein waveguide cores of the waveguide branches and the micro-resonators comprise said ferroelectric material, and wherein at least one branch and/or a micro-resonator coupled to it comprises an electrode for influencing the index of refraction of the ferroelectric material.

17. A device according to claim 16 comprising a plurality of micro-resonator pairs or groups of micro-resonator pairs, each micro-resonator pair comprising a

micro-resonator coupled to one branch and one micro-resonator coupled to the other branch, each micro-resonator pair or group of micro-resonator pairs comprising an electrode for influencing the index of refraction of the ferroelectric material, the different electrodes being separated from each other.

18. A dynamic wavelength router for routing optical signals of different wavelengths comprising a plurality of devices according to claim 17 connected to each other network-like.

19. A device according to claim 12 or 13 being a switchable out-coupler comprising an electrode for applying a periodic field to the ferroelectric material.

20. A device according to claim 12 or 13 being a pyroelectric sensor or a piezoelectric device.

21. A device according to claim 12 or 13 being a ferroelectric memory device.

22. An parametric amplifier or frequency doubling device, fabricated using a method according to any one of claims 1 to 10, comprising a waveguide formed by a layered structure and a cladding, wherein the layered structure comprises at least two layers of a ferroelectric material arranged adjacent to each other in a layer sequence, wherein the spontaneous polarization of neighboring layers of the layer sequence differs.

23. A parametric amplifier or frequency doubling device according to claim 22, wherein the layered structure comprises exactly three layers of one ferroelectric material.

24. A parametric amplifier or frequency doubling device according to claim 22 or 23, wherein the spontaneous polarization of neighboring layers in the layer sequence is opposed.

25. A parametric amplifier or frequency doubling device according to any one of claims 22 to 24, wherein the thickness of one layer of the layered structure correlated to the waveguide configuration in a manner that a higher than fundamental mode has a node close to an interface between two adjacent layers.

26. A parametric amplifier or frequency doubling device according to any one of the claims 22 to 25, wherein the dimensions of the waveguide are chosen such that the waveguide contribution to the chromatic dispersion and the chromatic dispersion contributed by the ferroelectric material compensate each other in a certain wavelength range.

27. A parametric amplifier, fabricated using a method according to any one of claims 1 to 10, comprising a waveguide formed by a layered structure and a cladding and further comprising electrodes with a periodic pattern, so the core waveguide may be poled periodically to achieve quasi phase matching for frequency doubling or parametric amplification.